


WHAT IS CLAIMED IS:

- 1 1. A method for facilitating inverse multiplexing over asynchronous transfer mode,
 2  comprising:
 3 receiving a stream of sequentially aligned ATM cells via an originating end point
 4 logical communication link;
 5 associating a sequence identifier with each one of said ATM cells for creating
 6 sequence identified ATM cells; and
 7 forwarding said sequence identified ATM cells in a distributed manner over a
 8 plurality of IM communication links, wherein a first one of said IM communication
 9 links having disparate data transmission rates in at least one data transmission
 10 direction with respect to a second one of said IM communication links. /
- 1 2. The method of claim 1 wherein associating the sequence identifier includes
 2 determining a sequence code for each one of said ATM cells and inserting the
 3 sequence code for each one of said ATM cells into an information payload portion of a
 4 corresponding one of said ATM cells.
- 1 3. The method of claim 1 wherein associating the sequence identifier includes
 2 determining a sequence code for each one of said ATM cells and inserting the
 3 sequence code for each one of said ATM cells into a header portion of a corresponding
 4 one of said ATM cells.
- 1 4. The method of claim 1 wherein associating the sequence identifier is facilitated by an
 2 originating endpoint IMA-ADSL communication device.
- 1 5. The method of claim 1 wherein forwarding said sequence identified ATM cells in a
 2 distributed manner over a plurality IM communication links includes forwarding said
 3 sequence identified cells over a plurality of IM-ADSL communication links.
- 1 6. The method of claim 5 wherein:

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2 a first one of said IM-ADSL communication links is synchronized at a first
3 upstream data transmission rate; and

4 a second one of said IM-ADSL communication links is synchronized at a second
5 upstream data transmission rate different than the first upstream data transmission rate.

1 7. The method of claim 5 wherein:

2 a first one of said IM-ADSL communication links is synchronized at a first
3 downstream data transmission rate; and

4 a second one of said IM-ADSL communication links is synchronized at a second
5 downstream data transmission rate different than the first downstream data
6 transmission rate.

1 8. The method of claim 5 wherein:

2 a first one of said IM-ADSL communication links is synchronized at a first
3 downstream data transmission rate and at a first upstream data transmission rate; and

4 a second one of said IM-ADSL communication links is synchronized at a second
5 downstream data transmission rate different than the first downstream data
6 transmission rate and at a second upstream data transmission rate different than the
7 first upstream data transmission rate.

1 9. The method of claim 1, further comprising:

2 receiving said sequence identified ATM cells by a destination endpoint IMA
3 communication device; and

4 forwarding an aligned stream of inversely multiplexed ATM cells across a
5 destination endpoint logical communication link.

1 10. The method of claim 9 wherein receiving said sequence identified ATM cells includes
2 holding at least a portion of said sequence identified ATM cells in a data storage
3 device.

PATENT APPLICATION

1 11. The method of claim 10 wherein forwarding the aligned stream of inversely
2 multiplexed ATM cells includes sequentially retrieving said sequence identified ATM
3 cells from the data storage device.

1 12. The method of claim 11 wherein sequentially retrieving said sequence identified ATM
2 cells includes determining the sequence identifier associated with a plurality of said
3 sequence identified ATM cells.

1 13. The method of claim 1, further comprising:
2 receiving said sequence identified ATM cells at a destination endpoint IMA
3 communication device;
4 determining a next one of said sequence identified ATM cells to forward over a
5 destination endpoint logical communication link; and
6 forwarding the next one of said sequence identified ATM cells over the destination
7 endpoint logical communication link.

1 14. The method of claim 13 wherein determining the next one of said sequence identified
2 ATM cells includes determining the sequence identifier for a plurality of sequence
3 identified ATM cells.

1 15. The method of claim 13 wherein determining and forwarding are facilitated by the
2 destination endpoint IMA communication device.

PATENT APPLICATION

1 16. A method for facilitating inverse multiplexing over asynchronous transfer mode, (IMA)
2 comprising:
3 receiving a stream of sequentially aligned ATM cells via an originating end point
4 logical communication link;
5 determining a sequence code for each one of said ATM cells;
6 inserting the sequence code for each one of said ATM cells into an information
7 block a corresponding one of said ATM cells for creating sequence identified ATM
8 cells;
9 forwarding said sequence identified ATM cells in a distributed manner over a
10 plurality of IM communication links, wherein a first one of said IM communication
11 links having disparate data transmission rates in at least one data transmission
12 direction with respect to a second one of said IM communication links; C. I
13 receiving said sequence identified ATM cells at a destination endpoint IMA-
14 communication device;
15 determining a next one of said sequence identified ATM cells to forward over a
16 destination endpoint logical communication link; and 9/21
17 forwarding the next one of said sequence identified ATM cells over the destination
18 endpoint logical communication link.

1 17. The method of claim 16 wherein forwarding said sequence identified ATM cells in a
2 distributed manner over a plurality IM communication links includes forwarding said
3 sequence identified cells over a plurality of IM-ADSL communication links, each one
4 of the plurality of IM-ADSL communication links synchronized at disparate data
5 transfer rates relative to each other one of the plurality of IM-ADSL communication
6 links.

PATENT APPLICATION

1 18. An apparatus for facilitating inverse multiplexing over asynchronous transfer mode
2 (IMA), the apparatus including an originating endpoint IMA communication device, a
3 destination endpoint IMA communication device, and a plurality of IM^{independently}
4 communication links implemented therebetween, a first one of said IM communication
5 links synchronized at a disparate data transmission rate in at least one data
6 transmission direction with respect to a second one of said IM communication links,
7 the originating endpoint IMA communication device being capable of:

8 receiving a stream of sequentially aligned ATM cells via an
9 originating end point logical communication link;
10 associating a sequence identifier with each one of said ATM cells
11 for creating sequence identified ATM cells; and
12 forwarding said sequence identified ATM cells in a distributed
13 manner over the plurality of IM communication links, wherein a first one of
14 said IM communication links having disparate data transmission rates in at
15 least one data transmission direction with respect to a second one of said
16 IM communication links.

1 19. The apparatus of claim 18 wherein the originating endpoint IMA communication
2 device being capable of associating the sequence identifier includes the originating
3 endpoint IMA communication device being capable of determining a sequence code
4 for each one of said ATM cells and inserting the sequence code for each one of said
5 ATM cells into a information payload portion of a corresponding one of said ATM
6 cells.

1 20. The apparatus of claim 18 wherein the originating endpoint IMA communication
2 device being capable of associating the sequence identifier includes the originating
3 endpoint IMA communication device being capable of determining a sequence code
4 for each one of said ATM cells and inserting the sequence code for each one of said
5 ATM cells into a header portion of a corresponding one of said ATM cells.

PATENT APPLICATION

- 1 21. The apparatus of claim 18 wherein the originating endpoint IMA communication
2 device is an originating endpoint IMA-ADSL communication device, the destination
3 endpoint IMA communication device is a destination end-point IMA-ADSL
4 communication device and the plurality of IM communication links are a plurality of
5 IM-ADSL communication links.
- 1 22. The apparatus of claim 21 wherein:
2 a first one of said IM-ADSL communication links is synchronized at a first
3 upstream data transmission rate; and
4 a second one of said IM-ADSL communication links is synchronized at a second
5 upstream data transmission rate different than the first upstream data transmission rate.
- 1 23. The apparatus of claim 21 wherein:
2 a first one of said IM-ADSL communication links is synchronized at a first
3 downstream data transmission rate; and
4 a second one of said IM-ADSL communication links is synchronized at a second
5 downstream data transmission rate different than the first downstream data
6 transmission rate.
- 1 24. The apparatus of claim 21 wherein:
2 a first one of said IM-ADSL communication links is synchronized at a first
3 downstream data transmission rate and at a first upstream data transmission rate; and
4 a second one of said IM-ADSL communication links is synchronized at a second
5 downstream data transmission rate different than the first downstream data
6 transmission rate and at a second upstream data transmission rate different than the
7 first upstream data transmission rate.
- 1 25. The apparatus of claim 18 wherein the destination endpoint IMA communication
2 device being capable of:
3 receiving said sequence identified ATM cells; and

PATENT APPLICATION

4 forwarding an aligned stream of inversely multiplexed ATM cells
5 across a destination endpoint logical communication link.

1 26. The apparatus of claim 25 wherein the destination endpoint IMA communication
2 device being capable of receiving said sequence identified ATM cells includes the
3 destination endpoint IMA communication device being capable of holding at least a
4 portion of said sequence identified ATM cells in a data storage device.

1 27. The apparatus of claim 26 wherein the destination endpoint IMA communication
2 device being capable of forwarding the aligned stream of inversely multiplexed ATM
3 cells includes the destination endpoint IMA communication device being capable of
4 sequentially retrieving said sequence identified ATM cells from the data storage
5 device.

1 28. The apparatus of claim 27 wherein the destination endpoint IMA communication
2 device being capable of sequentially retrieving said sequence identified ATM cells
3 includes the destination endpoint IMA communication device being capable of
4 determining the sequence identifier associated with a plurality of said sequence
5 identified ATM cells.

1 29. The apparatus of claim 18 wherein the destination endpoint IMA communication
2 device is capable of:
3 receiving said sequence identified ATM cells via at least two of the plurality of IM
4 communication links;
5 determining a next one of said sequence identified ATM cells to forward over a
6 destination endpoint logical communication link; and
7 forwarding the next one of said sequence identified ATM cells over the destination
8 endpoint logical communication link.

PATENT APPLICATION

- 1 30. The apparatus of claim 29 wherein the destination endpoint IMA communication
- 2 device being capable of determining the next one of said sequence identified ATM
- 3 cells includes the destination endpoint IMA communication device being capable of
- 4 determining the sequence identifier for a plurality of sequence identified ATM cells.

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PATENT APPLICATION

1 31. An apparatus for facilitating inverse multiplexing over asynchronous transfer mode,
2 the apparatus including an originating endpoint IMA-ADSL communication device, a
3 destination endpoint IMA-ADSL communication device, and a plurality of IM
4 communication links implemented therebetween, a first one of said IM-ADSL
5 communication links synchronized at a disparate data transmission rate in at least one
6 data transmission direction with respect to a second one of said IM communication
7 links, the originating endpoint IMA-ADSL communication device being capable of:
8 receiving a stream of sequentially aligned ATM cells via an
9 originating end point logical communication link;
10 determining a sequence code for each one of said ATM cells;
11 inserting the sequence code for each one of said ATM cells
12 into an information block a corresponding one of said ATM cells
13 for creating sequence identified ATM cells;
14 forwarding said sequence identified ATM cells in a
15 distributed manner over a plurality of IM communication links,
16 wherein a first one of said IM communication links having disparate
17 data transmission rates in at least one data transmission direction
18 with respect to a second one of said IM communication links; and
19 the originating endpoint IMA-ADSL communication device being capable of:
20 receiving said sequence identified ATM cells at a
21 destination endpoint IMA communication device;
22 determining a next one of said sequence identified ATM
23 cells to forward over a destination endpoint logical communication
24 link; and
25 forwarding the next one of said sequence identified ATM
26 cells over the destination endpoint logical communication link.

PATENT APPLICATION

- 1 32. A data processor program product, comprising:
2 a data processor program processable by a data processor of an originating
3 endpoint IMA communication device; and
4 an apparatus from which the data processor program is accessible by the data
5 processor of the originating endpoint IMA communication device;
6 the data processor program being capable of enabling the originating endpoint
7 IMA communication device to:
8 receive a stream of sequentially aligned ATM cells via an
9 originating end point logical communication link;
10 associate a sequence identifier with each one of said ATM cells for
11 creating sequence identified ATM cells; and
12 forward said sequence identified ATM cells in a distributed manner
13 over a plurality of IM communication links to a destination endpoint IMA
14 communication device, wherein a first one of said IM communication links
15 having disparate data transmission rates in at least one data transmission
16 direction with respect to a second one of said IM communication links.
- 1 33. The data processor program of claim 32 wherein the data processor program being
2 capable of enabling the originating endpoint IMA communication device to associate
3 the sequence identifier includes the data processor program being capable of enabling
4 the originating endpoint IMA communication device to determine a sequence code for
5 each one of said ATM cells and to insert the sequence code for each one of said ATM
6 cells into an information payload portion of a corresponding one of said ATM cells.
- 1 34. The data processor program of claim 32 wherein the data processor program being
2 capable of enabling the originating endpoint IMA communication device to associate
3 the sequence identifier includes the data processor program being capable of enabling
4 the originating endpoint IMA communication device to determine a sequence code for
5 each one of said ATM cells and to insert the sequence code for each one of said ATM
6 cells into a header portion of a corresponding one of said ATM cells.

PATENT APPLICATION

1 35. The data processor program of claim 32 wherein the data processor program being
2 capable of enabling the originating endpoint IMA communication device to forward
3 said sequence identified ATM cells in a distributed manner over a plurality IM
4 communication links includes the data processor program being capable of enabling
5 the originating endpoint IMA communication device to forward said sequence
6 identified cells over a plurality of IM-ADSL communication links.

1 36. The data processor program of claim 35 wherein:
2 a first one of said IM-ADSL communication links is synchronized at a first
3 upstream data transmission rate; and
4 a second one of said IM-ADSL communication links is synchronized at a second
5 upstream data transmission rate different than the first upstream data transmission rate.

1 37. The data processor program of claim 35 wherein:
2 a first one of said IM-ADSL communication links is synchronized at a first
3 downstream data transmission rate; and
4 a second one of said IM-ADSL communication links is synchronized at a second
5 downstream data transmission rate different than the first downstream data
6 transmission rate.

1 38. The data processor program of claim 35 wherein:
2 a first one of said IM-ADSL communication links is synchronized at a first
3 downstream data transmission rate and at a first upstream data transmission rate; and
4 a second one of said IM-ADSL communication links is synchronized at a second
5 downstream data transmission rate different than the first downstream data
6 transmission rate and at a second upstream data transmission rate different than the
7 first upstream data transmission rate.

PATENT APPLICATION

1 39. A data processor program product, comprising:

2 a data processor program processable by a data processor of a destination endpoint
3 IMA communication device; and

4 an apparatus from which the data processor program is accessible by the data
5 processor of the destination endpoint IMA communication device;

6 the data processor program being capable of enabling the destination endpoint
7 IMA communication device to:

8 receive sequence identified ATM cells in a distributed manner via a
9 plurality of IM communication links from an originating endpoint IMA
10 communication device ; and

11 forward an aligned stream of inversely multiplexed ATM cells
12 across a destination endpoint logical communication link.

1 40. The data processor program of claim 39 wherein the data processor program being

2 capable of enabling the destination endpoint IMA communication device to receive
3 said sequence identified ATM cells includes the data processor program being capable
4 of enabling the destination endpoint IMA communication device to hold at least a
5 portion of said sequence identified ATM cells in a data storage device.

1 41. The data processor program of claim 40 wherein the data processor program being

2 capable of enabling the destination endpoint IMA communication device to forward
3 the aligned stream of inversely multiplexed ATM cells includes the data processor
4 program being capable of enabling the destination endpoint IMA communication
5 device to sequentially retrieve said sequence identified ATM cells from the data
6 storage device.

1 42. The data processor program of claim 41 wherein the data processor program being

2 capable of enabling the destination endpoint IMA communication device to
3 sequentially retrieve said sequence identified ATM cells includes the data processor
4 program being capable of enabling the destination endpoint IMA communication

PATENT APPLICATION

5 device to determine the sequence identifier associated with a plurality of said sequence
6 identified ATM cells.

1 43. The data processor program of claim 39 wherein the data processor program being
2 capable of enabling the destination endpoint IMA communication device to forward an
3 aligned stream of inversely multiplexed ATM cells includes the data processor
4 program being capable of enabling the destination endpoint IMA communication
5 device to:

6 determine a next one of said sequence identified ATM cells to
7 forward over the destination endpoint logical communication link; and
8 forward the next one of said sequence identified ATM cells over the
9 destination endpoint logical communication link.

1 44. The data processor program of claim 13 wherein the data processor program being
2 capable of enabling the destination endpoint IMA communication device to determine
3 the next one of said sequence identified ATM cells includes the data processor
4 program being capable of enabling the destination endpoint IMA communication
5 device to determine the sequence identifier for a plurality of sequence identified ATM
6 cells.